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PATENT
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Serial No. 09/168,770 is being facsimile transmitted to
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Y. Grace Tsang
Date: October 24, 2002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of)

RASHMI K. SHAH)

Serial No. 09/168,770)

Filed October 8, 1998)

FLAMELESS COMBUSTOR PROCESS
HEATER)

Group Art: 1764

Examiner: Basia A. Ridley

October 24, 2002

ASSISTANT COMMISSIONER FOR PATENTS
Washington, DC 20231

Sir:

SUPPLEMENTAL RESPONSE

The Examiners are thanked for the courteous interview extended to Applicant's attorneys on October 17, 2002. The following amendments and remarks are made in response to various points and concerns raised by the Examiners during the October 17th interview.

Reconsideration of application in light of the amendments and remarks made in this Supplemental Response and Applicant's previous Response dated August 19, 2002, is respectfully requested.

AMENDMENTS

Please amend the claims as indicated below. A marked up copy of the amended claims is attached.

✓ 1. (Three times amended) A process heater for high temperature reactions comprising:

an oxidation chamber, the oxidation chamber having an inlet for an oxidant, an outlet for combustion products, and a flow path between the inlet and

5 the outlet;

a fuel conduit for transporting a fuel to the oxidation chamber, the fuel conduit containing a plurality of fuel nozzles along substantially the entire length of the oxidation chamber, each nozzle providing fluid communication from within the fuel conduit to the oxidation chamber, the fuel nozzles being spaced so that

61 10 fuel is added to the oxidation chamber at a rate that no flame results when the fuel is mixed with the oxidant flowing through the flow path in the oxidation chamber;

a preheater in fluid communication with the oxidation chamber inlet, the preheater capable of increasing the temperature of the oxidant to a temperature

15 resulting in the oxidant and fuel when mixed in the oxidation chamber being

hotter than the autoignition temperature of said mixture of oxidant and fuel; and

a process chamber in a heat exchange relationship with the oxidation chamber whereby a controllable heat flux is provided to the process chamber at a sufficiently high rate to complete the process being conducted therein, and the

20 heat transferred from the oxidation chamber to the process chamber does not

21 cause the temperature of the mixture of oxidant and fuel within the oxidation
27 chamber to decrease below the autoignition temperature of said mixture of
13 oxidant and fuel in the oxidation chamber.

18. (Amended) A flameless distributed combustion process heater for
high temperature reactions comprising:

an oxidation chamber, said oxidation chamber having an inlet for
oxidant and an outlet for combustion products, and a flow path between said inlet
5 and outlet;

a fuel conduit for transporting fuel into said oxidation chamber, said
fuel conduit containing a plurality of fuel nozzles distributed along substantially
the entire length of said oxidation chamber, said fuel nozzles being spaced so
10 that the flow of fuel through said fuel nozzles results in no flame when the fuel
passes through the nozzles and is mixed with oxidant flowing through said flow
path in said oxidation chamber;

a preheater in fluid communication with said oxidation chamber, for
preheating said oxidant to above a temperature at which when said oxidant and
fuel are mixed in said oxidation chamber, the temperature of said mixture of

15 oxidant and fuel exceeds the autoignition temperature of said mixture; and

a process chamber in heat exchange relationship with said
oxidation
chamber, said plurality of nozzles distributed along substantially the entire length
of said oxidation chamber being sized to provide the desired temperature